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ABSTRACT

A study was undertaken at Arizona's Pima Community College (PCC) to determine the extent to which entering students took writing, reading, and mathematics placement tests and followed placement recommendations, as well as the relationship between the completion of recommended courses and subsequent academic performance. The study sample consisted of 1,824 full-time students entering PCC in fall 1988 who were American citizens or resident aliens and who were enrolling in higher education for the first time, with outcomes being tracked through spring 1992. Study findings included the following: (1) 55% (n=997) of the students took all three subject area placement tests prior to the third hour of instruction, per PCC policy; (2) 91% of those who took the mathematics test, 86% of those taking the writing test, and 65% of those taking the reading test received recommendations for developmental coursework in the respective subjects; (3) these recommendations were followed by 72% of those taking the writing test, 71% of those taking the mathematics test, and 54% of those taking the reading test; and (4) students who took and completed recommended courses performed better than those who did not or who did not complete their courses successfully in terms of first semester and cumulative grade point average and ratio of completed to attempted courses. A description of the data elements collected on the sample is appended. (BCY)

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Developmental Course-Taking and Subsequent Academic Performance at Pima Community College

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Developmental Course-Taking and Subsequent Academic Performance at Pima Community College

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Developmental Course-Taking and Subsequent Academic Performance at Pima Community College

Executive Summary

The purpose of this study was to address questions posed by the PCC district-wide Committee on Developmental Education concerning the relationship between developmental course-taking and subsequent academic performance at PCC. Specifically, the study sought to determine: (1) the extent to which entering students took the placement tests in writing, reading, and mathematics according to college policy (i.e., prior to the completion of the third hour of instructional activity); (2) the extent to which students followed recommendations, based on these tests, to take developmental courses; and (3) the relationship between completion of recommended developmental courses early in one's PCC career and subsequent academic performance (as indicated by gpa, the ratio of completed to attempted courses, and graduation).

The findings of the study include:

(1) A majority (55%, 997 students) of non-foreign, full-time, new-to-higher students enrolling at PCC in Fall 1988 took all three subject area placement tests--writing, reading, and mathematics--per college policy, that is, prior to the third hour of instructional activity. Another third of these students took two of the three tests prior to the third hour of instructional activity. About 90% took the writing and reading tests, 60% the mathematics test.

(2) Nearly 90% (writing: 1,369 students, mathematics: 921 students) of those who took the writing and mathematics tests received recommendations for developmental coursework in those subject areas, about 60% (1,034 students) of those who took the reading test. Almost 60% (569 students) of those who took all three tests received recommendations in all three areas.

(3) About 70% (writing: 979 students, mathematics: 650 students) of those who received recommendations for developmental coursework in writing and mathematics followed the recommendations during their first semester at PCC; just over 50% (563 students) of those who received recommendations for developmental coursework in reading did so.

(4) Students who completed (i.e., received a grade of A-F) recommended development coursework during the first semester performed better in concurrent and subsequent coursework than students who did not take recommended developmental coursework during the first semester and much better than those who took but failed to complete (i.e.,

received a grade of W, Y, or I) recommended developmental coursework during the first semester. This is true for all three subject areas and for a variety of performance measures (viz., first semester gpa, ratio of completed to attempted courses during the first semester, cumulative gpa through Spring 1992, ratio of completed to attempted courses through Spring 1992).

(5) First-year course completion rates for nine developmental courses (WRT070, WRT100, REA100, REA101, REA110, REA111, MTH060, MTH070, MTH110) ranged from 42% to 83%, with a mean of 75%. REA100 and WRT070 had the lowest completion rates.

(6) Compared either with students who took but failed to complete at least one developmental course by the end of the second semester or with students who did not take at least one recommended developmental course by the end of the second semester, students who completed at least one recommended developmental course by that time were more likely to have completed fifteen or more total credits and to have graduated by the end of the fourth year.

(7) Compared either with students who took but failed to complete HDE100 with a grade of C or higher or with students who did not take HDE100, students who completed this course with a grade of C or higher achieved a higher mean cumulative gpa and earned, on average, a higher number of total credits through Spring 1992. However, the three groups do not differ in terms of the percentage that graduated by Spring 1992.

(8) Students who earned a grade of C or higher in CHM080 were as likely as students who did not take CHMO80 to earn a grade of C or higher in CHM151.

While this study suggests that taking recommended developmental courses promotes performance in subsequent coursework, it does not demonstrate a causal relationship between these variables. This is because the research design requested by the Committee did not take into account additional factors that influence academic performance. In addition, because the sample was limited to students from a single entering cohort (Fall 1988), we do not know whether or not the findings are generalizable over time.

The report concludes with recommendations for additional research regarding (1) the relationship between developmental course-taking and subsequent academic performance, and (2) the causes of high withdrawal rates from recommended developmental courses.

PURPOSE

In 1991, the districtwide Committee on Developmental Education asked the Institutional Research Office (IRO) to conduct research that would provide baseline information about the academic performance of entering PCC students who took developmental courses. Initially, the Committee proposed a set of nine research questions. One of these questions concerned the extent to which students who took recommended developmental courses completed them, the other eight how well students who completed recommended developmental courses performed at PCC. Performance was to be judged in terms of semester and cumulative GPA, credits earned, and graduation. Subsequently, as a result of discussions with IRO staff, the Committee proposed additional questions for research. They also wanted to know the extent to which entering students took "required" placement tests and the extent to which they enrolled in developmental courses recommended on the basis of their scores on those tests. It also was decided that additional measures of performance--the ratio of completed to attempted courses during the first semester and during the course of PCC enrollment--would be examined.

This is a report of the research that IR conducted to address the areas of concern identified by the districtwide Committee on Developmental Education. Specifically, it provides answers to the following seven questions:

(1) To what extent do PCC full-time students take placement tests per college policy, that is, "prior to the student's third hour of instructional activity . . . during his/her initial semester of enrollment"?

(2) To what extent do students who receive recommendations for pre-collegiate coursework enroll in recommended courses?

(3) Compared with students who do not take recommended developmental education courses, do students who complete (i.e., earn grades of A through F) recommended developmental courses:

- (a) attain higher first semester GPAs?
- (b) achieve higher ratios of completed to attempted courses during their first semester?
- (c) attain higher overall GPAs?
- (d) achieve higher ratios of completed to attempted courses over the course of their enrollment at PCC?

(4) To what extent do students complete (i.e., earn grades of A through F) the following developmental courses: MTH060, MTH070, MTH110, WRT070, WRT100, REA100, REA101, REA110 AND REA111?

(5) Compared with students who do not enroll in or who fail to

complete at least one recommended developmental course by the end of the second semester, are students who complete (earn grades of A through F in) at least one recommended developmental course by the end of the second semester more likely to:

(a) complete (i.e., earn grades of A through F) 15 or more credits of higher level courses by the end of the fourth year?

(b) graduate (complete certificates and degrees) by the end of the fourth year?

(6) Compared with students who do not enroll in HDE100 ("College Success Skills") or who fail to complete it with at least a grade of C or higher, are students who earn grades of C and higher in HDE100 more likely to:

(a) attain higher overall GPAs?

(b) complete 15 or more units of general education courses?

(c) graduate (complete certificates and degrees)?

(7) Compared with students who do not enroll in CHM080 or who fail to complete it with a grade of C or higher, are students who earn grades of C and higher in CHM080 more likely to earn grades of C and higher in CHM151?

The answers to these research questions will assist in the appraisal of developmental education by providing data on the proportion of students taking placement tests, the degree to which placement recommendations are followed, and the strength of the associations between developmental course completion and various indices of academic performance. In addition, the information will provide baseline data for future studies.

PREVIOUS RESEARCH

A small number of studies, published between 1990 and 1995, have examined the impact of developmental course completion on subsequent academic performance. Most of this research has operationalized performance as passing collegiate-level courses. For example, in a recent study at Niagara County Community College (NY), Feldman (1995) found that students who took and passed basic skill courses between 1985 and 1992 had passing rates in regular courses that were similar to the passing rates of students who did not need basic skill courses. Further, the rate of passing regular courses decreased with a decrease in the rate of passing basic skill courses.

Earlier, Haeuser (1993) reported that students who completed required English and mathematics developmental courses at Anne Arundel Community College (MD) during Fall 1991 were as successful in four

(unnamed) credit courses as students who did not need developmental courses. The passing rates for the two groups were 74% and 78%, respectively. But students who failed to completed developmental requirements were considerably less successful (57% passing rate).

Platt's (1993) study of students in sixteen Texas community colleges showed a passing rate (80%) in college-level English courses for those who completed reading remediation that compared favorably to the rate (85%) for students who did not need remediation. The difference in college algebra passing rates for students who completed required developmental mathematics course work (64%) and those who did not need mathematics remediation (75%) was somewhat larger.

A few studies have focused on measures of performance other than passing rates in collegiate-level courses. Lyons (1990) examined the actual grades received in collegiate courses at New River Community College (VA) in Spring 1990 by students who had and had not previously taken developmental courses at the college. He found that students who had passed developmental English courses received more grades of C or higher in the next non-developmental English course than students who had not taken the developmental English classes (74% and 66%, respectively) but also more D's and F's (27% and 18%, respectively). To the contrary, students who passed developmental mathematics courses earned fewer C or higher grades than those who had not (52% and 64%, respectively).

In another study involving grade performance in individual courses, Kraska, Nadelman, Maner, and McCormick (1990) found that students who took developmental courses at Wor-Wic Tech Community College (MD) had higher GPAs than nondevelopmental students in specific English and mathematics courses.

Napoli and Hiltner (1993) compared the overall GPAs of developmental reading students attending Suffolk Community College (NY) between Fall 1988 and Fall 1991 with those of two other groups: students who needed but failed to take developmental reading courses and students who did not need reading remediation. Developmental reading students had lower GPAs (2.40) than nondevelopmental students (2.60) but much higher GPAs than students who failed to take needed developmental reading coursework (1.93). However, when the researchers controlled for credit hours accumulated and beginning reading level (in separate analyses), the developmental students outperformed both groups on the adjusted GPAs.

Collectively, the foregoing studies suggest a positive impact of developmental course-taking on later academic achievement. They are not definitive in this regard, however. Because they do not (or not adequately)

take account of factors other than developmental course completion that influence performance in collegiate-level courses, the relationship between developmental course completion and subsequent academic performance demonstrated in these studies may be spurious rather than causal.

DATA SOURCES

The subjects for this study were all new-to-higher education students who entered PCC in Fall 1988 (the Fall 1988 Cohort). Information Technology Office (ITO) personnel created a data base specifically for the purposes of this study by extracting demographic and semester-to-semester course-taking and performance data on these students from the College's Student Information System (SIS) and placing them in a longitudinal tracking file. (ITO staff extracted data on initial placement recommendations from historic assessment files.) The longitudinal file permitted the tracking of cohort members through Spring 1992. (See Appenidix A for a listing of the data elements included in the file.)

Addressing the research questions necessitated a prior determination of the universe of developmental courses at PCC. The Developmental Education Committee decided that, for the purpose of this study, developmental courses were all PCC courses that conform to the state of Arizona's definition of a precollegiate course--numbered less than 100--as well as certain above-100 introductory courses--MTH110, REA100, REA101, REA110, REA 111, and WRT 100--which the College has internally defined as developmental.

Description of the Fall 1988 Cohort

In the fall of 1988, 5,822 PCC students were first-time-in-higher education enrollees. Of these, 1,824 were American citizens or resident aliens enrolled full-time at the College, that is, for 12 or more credit hours, in Fall 1988. Most of the analyses were conducted with these non-foreign, full-time students.

Thirty-five percent of the cohort's full-time members was minority (Table 1). This is slightly less than the percentage of the total cohort that was minority (37%) but substantially more than the percentage of either the College's total Fall 1988 enrollment (29%) or the county's 1990 Census population for individuals over the age of 15 (28%) that was minority. These differences in minority representation reflect

differences in Hispanic representation. New students to the College are more likely to be Hispanic than either the total college fall enrollment or the county's over-15 population.

Table 1. Fall 1988 Cohort Membership, Total Fall 1988 PCC Credit Enrollment, and the 1990 Census Pima County Population Count by Ethnicity

Ethnicity	Full-Time Non-Foreign Cohort		Total Cohort		Fall Enrollment		County Population	
	N	%	N	%	N	%	N	%
Native Americans	54	3%	144	3%	563	2%	11,122	2%
African Americans	76	4%	196	3%	904	3%	14,023	3%
Asian Americans	39	2%	147	3%	682	3%	8,814	2%
Hispanic	468	26%	1,682	28%	5,634	21%	109,442	21%
Anglo/Other	1,187	65%	3,653	63%	19,027	71%	374,128	72%
Total	1,824	100%	5,822	100%	26,810	100%	517,529	100%

ANALYTICAL METHODS

IR staff initiated analysis by converting the longitudinal data file into an SPSS system file. Staff used the SPSS statistical package to perform two kinds of analyses on data in the file: (1) Determination of the frequency with which members of the cohort exhibited particular behaviors, for example, taking (or not taking) the placement tests per College policy, and (2) comparison of the behavior of one subset of the cohort with that of another. An example of the latter is comparing the average cumulative GPA of those who had completed recommended developmental education courses with that of those who had not. Two different statistical procedures were used to make the comparisons. An analysis of variance was used when the comparison involved continuously scored data (e.g., GPA or the ratio of credits completed to credits attempted). When the dependent or outcome variable was categorical such as whether a student graduated or not, a Chi-squared analysis was conducted.

FINDINGS

Question 1: To what extent do PCC full-time students take placement tests per college policy, that is, "prior to the student's third hour of instructional activity . . . during his/her initial semester of enrollment"?

The close of the Fall 1988 drop/add period approximately coincided with the cohort members' completion of their third hour of instructional activity; the former was used as a marker for the latter. As shown in Table 2, before the close of the Fall 1988 drop/add period, about a third (31%) of the entire Fall 1988 cohort had taken all three placement tests--reading, writing, and mathematics. Eighteen percent had taken two of the tests, 3% one, and almost half (48%) none at all. Forty-eight percent had taken the writing test, 50% the reading test, and 34% the mathematics test. These percentages represent 2,809, 2,908, and 1,975 students, respectively. (During 1989-90, the earliest academic year for which we have data collegewide students sat for 10,264 reading tests, 8,296 writing tests, and 9,044 mathematics tests).

Table 3 shows the number and percent of cohort members who took each test who received a recommendation for developmental coursework in the test area. Sixty-five percent of those who took the reading test, 86% of those who took the writing test, and 91% of those who took the mathematics test received recommendations for developmental coursework in the respective subject areas.

Tables 2 and 3 also depict placement test-taking and recommendation data for the full-time, non-foreign members of the Fall 1988 cohort. As might be expected, given that the policy concerning placement tests only applies to full-time students, the full-time members of the cohort were more likely than those of the entire cohort to take the placement tests. Thus over half (55%) of the full-time members had taken all three tests by the close of drop/add. Thirty-four percent had taken two, 2% one, and 9% none. (Eighty-eight percent had taken the writing test, 90% the reading test, 57% the mathematics test.) On the other hand, the full-time test-takers were slightly less likely to receive remedial course recommendations in each area (63%, 85%, and 89% in reading, writing, and mathematics, respectively).

Table 4 displays the numbers and kinds of recommendations for developmental coursework received by cohort members who took all three tests. Fifty-nine percent of all cohort members who took all three tests received recommendations in three areas, 27% in two areas, and 12% in

one area. For full-time, non-foreign cohort members who took all three tests, the respective percentages are: 57%, 26%, and 14%.

Table 2. Number and Proportions of Cohort Members Taking Various Combinations of Placement Tests

Tests Taken	All		Full-Time	
	N	%	N	%
All Three Tests	1,806	31%	997	55%
Two Tests				
Writing & Reading	1,002	17%	609	33%
Writing & Mathematics	1	<1%	0	0%
Reading & Mathematics	53	1%	15	1%
	1,056	18%	624	34%
One Test				
Writing	0	0%	0	0%
Reading	47	1%	18	1%
Mathematics	115	2%	24	1%
	162	3%	42	2%
No Tests	2,798	48%	161	9%
TOTAL	5,822	100%	1,824	100%

Table 3. Numbers and Proportions of Placement Test Takers in the Cohort Who Received Recommendations for Developmental Coursework by Subject Area

Area	All			Full-Time		
	Number Tested	Number Receiving Recommend.	%	Number Tested	Number Receiving Recommend.	%
Writing	2,809	2,421	86%	1,606	1,369	85%
Reading *	2,908	1,895	65%	1,639	1,034	63%
Mathematics	1,975	1,803	91%	1,036	921	89%

*Any Student whose score on the reading test indicated a deficiency in reading skills received a recommendation to enroll in REA100. An REA100 instructor had the option to redirect such a student to a more advanced developmental reading course (REA101, REA110, REA111) anytime during the semester if the instructor deemed the advanced course a better fit.

Table 4. Numbers and Kinds of Recommendations for Developmental Coursework Received by Cohort Members Who Took All Three Placement Tests

Area(s) in which Received Recommendation(s)	All		Full-Time	
	N	%	N	%
All Three Areas	1,074	59%	569	57%
Two Areas				
Writing & Reading	60	3%	41	4%
Writing & Mathematics	372	21%	192	19%
Reading & Mathematics	51	3%	27	3%
	483	27%	260	26%
One Area				
Writing	45	3%	30	3%
Reading	6	<1%	5	1%
Mathematics	157	9%	101	10%
	208	12%	136	14%
No Areas	41	2%	32	3%
TOTAL	1,806	100%	997	100%

Question 2: To what extent do students who receive recommendations for pre-collegiate coursework enroll in recommended courses?

As shown in Table 5, about 70% of those who received a recommendation for developmental coursework in writing and mathematics followed the recommendation during the first semester of enrollment, while slightly over half who received a recommendation for developmental coursework in reading enrolled in the recommended course.

Table 5. Number and Percent of Full-Time Cohort Members Receiving Recommendations for Developmental Coursework Who Did and Did Not Follow Recommendations During First Semester by Subject Area

	Received Recommendation	Followed Recommendation		Did Not Follow Recommendation	
	N	N	%	N	%
Writing	1,369	979	72%	390	28%
Reading *	1,034	563	54%	471	46%
Mathematics	921	650	71%	271	29%

* A student followed the reading recommendation if he or she received a recommendation to take REA100 and received a final grade (including W, Y, or I) in REA100, REA101, REA110, or REA111.

Question 3a: Compared with students who do not take recommended developmental courses, do students who complete (i.e., earn grades of A-F) recommended developmental courses attain higher first semester GPAs?

As shown in the fourth column of Table 6, for each subject area--writing, reading, and mathematic--students who earned a grade (A-F) in recommended developmental coursework during the first-semester of their enrollment (Fall 1988) earned a higher first semester GPA than did those who did not take the recommended developmental coursework. **In each case, the difference is statistically significant.**

Table 7 includes in each subject-area comparison students who enrolled in recommended coursework in the area during the first semester but failed to complete it (i.e., withdrew from the coursework [W or Y] or did not complete all assignments required for a final grade [I]). As shown in the fourth column of Table 7, for each subject area these students had much lower first-semester GPAs than either those who earned a grade in the recommended coursework or those who failed to take it all. **The differences are statistically significant.**

Table 6. Comparison of Performance of Full-Time Cohort Members Who Earned a Grade (A-F) in Recommended Developmental Courses during the First Semester with Those Who Did Not Take Recommended Developmental Courses during the First Semester by Subject Area

SUBJECT AREA	Enrollment and Grade Status	Number of Students	Mean - GPA Fall 1988	Ratio of Credits Completed to Atempted, Fall 1988	Mean Cummulative GPA (through Spring 1992)	Ratio of Total Credits Completed to Total Attempted (through Spring 1992)
Writing	Recomm. Not Taken	390	2.43	0.71	2.45	0.66
	A-F in Recomm.	739	2.74	0.85	2.61	0.73
F Statistic Level of Sign.			25.67 p<.000	73.23 p<.000	9.37 p=.002	19.82 p<.000
Reading	Recomm. Not Taken	471	2.34	0.72	2.36	0.65
	A-F in Recomm.	398	2.76	0.86	2.56	0.74
F Statistic Level of Sign.			36.91 p<.000	59.23 p<.000	10.90 p=.001	27.36 p<.000
Math	Recomm. Not Taken	271	2.37	0.71	2.42	0.63
	A-F in Recomm.	431	2.69	0.85	2.54	0.73
F Statistic Level of Sign.			16.77 p<.000	42.54 p<.000	3.07 p=.08	26.57 p<.000

Table 7. Comparison of Performance of Full-Time Cohort Members Who Earned a Grade (A-F) in Recommended Developmental Courses during the First Semester, Those Who Did Not Take Recommended Developmental Courses During the First Semester, and Those Who Failed to Complete Them (W, Y, or I) during the First Semester by Subject Area

SUBJECT AREA	Enrolled and Grade	Number of Students	Mean - GPA Fall 1988	Ratio of Credits Completed to Attempted, Fall 1988	Mean Total Cummulative GPA (through Spring 1992)	Ratio of Total Credits Completed to Total Attempted (through Spring 1992)
Writing	Recomm. Not Taken	390	2.43	0.71	2.45	0.66
	A-F in Recomm.	739	2.74	0.85	2.61	0.73
	W, Y or I in Recomm.	240	1.10	0.26	1.49	0.31
F Statistic Level of Sign.			128.08 p<.000	474.05 p<.000	130.13 p<.000	258.75 p<.000
Reading	Recomm. Not Taken	471	2.34	0.72	2.36	0.65
	A-F in Recomm.	398	2.76	0.86	2.56	0.74
	W, Y or I in Recomm.	165	1.07	0.22	1.41	0.27
F Statistic Level of Sign.			140.88 p<.000	340.58 p<.000	86.98 p<.000	217.57 p<.000
Math	Recomm. Not Taken	271	2.37	0.71	2.42	0.63
	A-F in Recomm.	431	2.69	0.85	2.54	0.73
	W, Y or I in Recomm.	219	1.43	0.30	1.73	0.35
F Statistic Level of Sign.			89.94 p<.000	293.37 p<.000	49.76 p<.000	171.41 p<.000

Question 3b: Compared with students who do not take recommended developmental courses, do students who complete (i.e., earn grades of A-F) recommended developmental courses achieve higher ratios of completed to attempted courses during their first semester?

Column 5 of Table 6 compares the ratio of completed to attempted courses during the first semester of enrollment for those full-time members of the Fall 1988 cohort who earned a grade in recommended developmental coursework during the first semester with that for those who did not take recommended developmental coursework during the first semester. For each subject area, those who earned grades in developmental coursework had a higher completed-to-attempted courses ratio than those who failed to take recommended developmental coursework. **Each of the differences is statistically significant.**

A three-way comparison that also includes students who enrolled in recommended developmental coursework during the first semester but failed to complete it shows that for each subject-area these students had much lower first-semester courses-completed-to-courses-attempted ratios than did either students who received grades in the coursework or those who failed to take it at all (see column 5 of Table 7). **The differences are statistically significant.**

Question 3c: Compared with students who do not take recommended developmental courses, do students who complete (i.e., earn grades of A-F) recommended developmental courses attain higher overall GPAs?

As depicted in the sixth column of Table 6, the mean cumulative GPA through Spring 1992 for students who earned grades in recommended developmental writing coursework in each subject area--writing, reading, and mathematics--was higher than the mean cumulative GPA for those who did not take recommended coursework in the subject area. **For reading and writing, the differences are statistically significant.**

When the comparison includes students who failed to complete recommended developmental coursework, we find that for each subject area these students had much lower mean cumulative GPA than either those who earned grades in the recommended coursework or those who failed to take it all. **Furthermore, for each subject area the differences are statistically significant** (see column 6 of Table 7).

Question 3d: Compared with students who do not take recommended developmental courses, do students who complete (i.e., earn grades of A-F) recommended developmental courses achieve higher ratios of completed to attempted courses over

the course of their enrollment at PCC?

The last column of Table 6 compares the ratio of total completed to total attempted PCC courses for those full-time members of the Fall 1988 cohort who earned a grade in recommended developmental coursework during the first semester with that for those who did not take recommended developmental coursework during the first semester. For each subject area, those who earned grades in developmental coursework had a higher completed-to-attempted courses ratio than those who failed to take recommended developmental coursework. **Each of the differences is statistically significant.**

In a three-way comparison that also includes students who enrolled in recommended developmental coursework during the first semester but failed to complete it, for each subject-area these students had much lower total-courses-completed-to-total-courses-attempted ratios than did either students who received grades in the coursework or those who failed to take it at all (see the last column of Table 7). **The differences are statistically significant.**

Question 4: To what extent do students complete (i.e., earn grades of A-F) the following developmental courses: MTH060, MTH070, MTH110, WRT070, WRT100, REA100, REA101, REA110 AND REA111?

As shown in Table 8, completion rates for these developmental courses taken during the first year ranged from 42% to 83%, with a mean completion rate of 66%. With the exception of REA100, all of the completion rates exceeded 50%. In addition, with the exception of the lowest level writing (WRT070) and reading (REA100) courses, more than half of the students who took each course completed it with a passing grade (A, B, C, or P). The completion rates for most of these developmental courses compare favorably with that for all PCC courses (72%) (Pima Community College Institutional Research Office, 1996).

Table 8. Number and Percent of Full-Time Cohort Members Completing (Earning A-F), Failing to Complete, and Earning Various Grades in Various Developmental Courses

Course	A, B, C, or P		D or F		Y		W		Course Completion Rate
	N	%	N	%	N	%	N	%	
MTH 060	288	58%	58	12%	82	17%	65	13%	70%
MTH 070	475	51%	150	16%	174	18%	137	15%	67%
MTH 110	22	52%	3	7%	9	22%	8	19%	60%
WRT 070	153	48%	16	5%	76	24%	71	23%	53%
WRT 100	684	65%	70	7%	188	18%	107	10%	72%
REA 100	53	39%	4	3%	20	15%	59	43%	42%
REA 101	49	70%	3	4%	17	24%	1	2%	74%
REA 110	181	68%	13	5%	46	17%	25	10%	73%
REA 111	128	81%	3	2%	20	13%	7	4%	83%

Question 5a: Compared with students who do not enroll in or who fail to complete at least one recommended developmental course by the end of the second semester, are students who complete (i.e., earn grades of A-F) at least one recommended developmental course more likely to complete (earn grades of A-F in) 15 or more credits of higher level courses by the end of the fourth year?

This question could not be answered directly as there was no information in the data base on credit earned in specific kinds of courses other than developmental courses. There was information on credits earned in all courses and this variable was used as a surrogate for credits earned in higher level courses under the assumption that as students accumulated more total credits they would also accumulate more higher-level course credits. Table 9 compares the number of total credits earned over four years by students who received a grade in a recommended developmental course with that earned by those who had not. Students who completed at least one recommended developmental course earned, on average, four more credits than students who did not take at least one recommended developmental course and 11 more than those who took but failed to complete at least one recommended developmental course. **The differences are statistically significant ($F=17.172$, $df=2$, $p<.001$).**

Table 9. Comparison of Total Hours Completed by Spring 1992 by Full-Time Members of the Cohort Who Completed (Received A-F in), Failed to Complete, and Failed to Take At Least One Recommended Developmental Courses by Spring 1989

Credit Hours Completed (through Spring 1992)	Group I Received a Grade in Any Recommended Developmental Course		Group II Did Not Take Any Rcommended Developmental Course		Group III Received Only W, Y or I Grades in Recommended Developmental Courses	
	N	%	N	%	N	%
Less than 15	97	18%	66	27%	140	37%
16 - 30	113	21%	46	19%	69	18%
31 - 45	94	17%	32	13%	46	12%
46 - 60	79	14%	39	16%	46	12%
More than 60	162	30%	63	25%	78	21%
Total	545	100%	246	100%	379	100%
Average Number of Credits	43.9		39.7		33.2	

Question 5b: Compared with students who do not enroll in or who fail to complete at least one recommended developmental course by the end of the second semester, are students who complete (i.e., earn grades of A-F) at least one recommended developmental course more likely to graduate (complete certificates and degrees) by the end of the fourth year?

Table 10 compares the graduation rate as of May 1992 of students who had completed at least one recommended developmental course by Spring 1989 with those of students who had not taken any recommended developmental course and of students who had enrolled in but failed to complete at least one recommended developmental course. Students who completed at least one recommended developmental course were three percent more likely to graduate than students who did not take any recommended developmental courses and seven percent more likely than

students who took but failed to complete at least one recommended developmental course. **The differences are statistically significant (F=10.894, df=2, p<.004).**

Table 10. Comparison of The Graduation Rates through Spring 1992 of Full-Time Cohort Members Who Received a Grade (A-F) in at Least One Recommended Developmental Course, Those Who Did Not Take at Least One Recommended Developmental Course, and Those Who Took but Failed to Complete at Least One Developmental Course by Spring 1989

Graduation Status (through Spring 1992)	Group I Received a Grade in Any Recommended Developmental Course		Group II Did Not Take Any Rcommended Developmental Course		Group III Received Only W, Y or I Grades in Recommended Developmental Courses	
	N	%	N	%	N	%
Earned a degree or certificate	75	14%	28	11%	26	7%
Did not earn a degree or certificate	470	86%	218	89%	353	93%
Total	545	100%	246	100%	379	100%

Question 6a: Compared with students who do not enroll in HDE100 ("College Success Skills") or who fail to complete it with at least a grade of C or higher, are students who earn grades of C and higher in HDE100 more likely to attain higher overall GPAs?

As shown in Table 11, by the end of the fourth year (Spring 1992) only three percent (51) of the students in the full-time cohort had taken HDE100. The 32 takers who earned a grade of C or higher in the course had a higher mean GPA (2.64) than that of students who did not take the course (2.42) and, particularly, of the 19 takers who earned a D or F in, or failed to complete, it (2.08). The differences, though large, are not statistically significant (F=1.726, df=2, p<.178). (The lack of statistical significance could be a statistical artifact of the disproportionately large number of

students who did not take the class.)

Table 11. Comparison of Mean Cumulative GPAs through Spring 1992 of Full-Time Cohort Members Who Earned an A, B, C or P in HDE 100, Those Who Earned a D, F, W or Y in HDE 100, and Those Who Did Not Take HDE 100

HDE 100 Status (through Spring 1992)	Number of Students Enrolled	% of Full-Time Students in Fall 1988	Comulative GPA
Earned A, B, C or P	32	2%	2.64
Earned D, F, W or Y	19	1%	2.08
Did not take the class	1,773	97%	2.42
Total	1,824	100%	2.43

Question 6b: Compared with students who do not enroll in HDE100 ("College Success Skills") or who fail to complete it with at least a grade of C or higher, are students who earn grades of C and higher in HDE100 more likely to complete 15 or more units of general education courses?

As noted earlier, information about credits completed in categories of courses other than developmental courses was not available in the data base. As a substitute for general education credits completed, total credits was used under the assumption that as more total credits were accumulated more general education credits would also be accumulated. Table 12 compares mean total credit hours earned by students who earned a grade of C or higher in HDE100 with mean total credit hours earned by those who earned a D or an F in, or failed to complete, the course and by those who did not take the course. Students who earned a grade of C or higher in HDE100 earned, on average, almost twice as many credits (48 as compared to 25) as those who earned a D or an F or who failed to complete the course. Compared to students who never took HDE100, they earned nearly one and a half times as many credits (48 vs. 36). **These differences are statistically significant (F=4.793, df=2, p<008).**

Table 12. Comparison of Mean Total Credits Completed through Spring 1992 by Full-Time Cohort Members Who Earned an A, B, C or P in HDE 100, Those Who Earned D, F, W or Y in HDE 100, and Those Who Did Not Take HDE 100

HDE 100 Status (through Spring 1992)	Number of Students Enrolled	% of Full-Time Students in Fall 1988	Total Credits Earned at PCC
Earned A, B, C or P	32	2%	48.4
Earned D, F, W or Y	19	1%	25.5
Did not take the class	1,773	97%	35.6
Total	1,824	100%	35.7

Question 6c: Compared with students who do not enroll in HDE100 ("College Success Skills") or who fail to complete it with at least a grade of C or higher, are students who earn grades of C and higher in HDE100 more likely to graduate (complete certificates and degrees)?

As depicted in Table 13, students in the cohort who did not take HDE100 were as likely as students who earned a C or higher in the course to complete a degree or certificate. Although students who earned a D or an F in, or failed to complete, HDE were slightly more likely (+1%) than those who achieved a C or above to graduate, this difference is not statistically significant ($F=.033$, $df=2$, $p<.984$).

Table 13. Comparison of Graduate Rates through Spring 1992 of Full-Time Cohort Members Who earned an A, B, C or P in HDE 100, Those Who Earned a D, F, W or Y in HDE 100, and those Who Did Not Take HDE 100

Graduation Status (through Spring 1992)	HDE 100 Status					
	Earned A, B, C or P		Earned D, F, W or Y		Did not take the class	
	N	%	N	%	N	%
Earned a degree or certificate	3	9%	2	10%	165	9%
Did not earn a degree or certificate	29	91%	17	90%	1,608	91%
Total	32	100%	19	100%	1,773	100%

Question 7: Compared with students who do not enroll in CHM080 or who fail to complete it with at least a grade of C or higher, are students who earn grades of C and higher in CHM080 more likely to earn grades of C or higher in CHM151?

Only two of the 79 students who took CHM080 failed to earn a grade of C or higher. Thus the comparison is limited to students who earned a grade of C or higher in CHM080 and those who did not take the course at all. (Presumably, the latter students scored sufficiently high on the chemistry placement test to waive the requirement that CHM080 be taken as a prerequisite to CHM151). As shown in Table 14, students who earned a grade of C or higher in CHM080 were about as equally likely (73% vs. 75%) as those who did not take CHM080 to earn a grade in the C-or-higher range in CHM151. The slight difference between the groups in the percentage achieving a grade of C or higher in CHM151 is not statistically significant ($F=.051$, $df=1$, $p<.822$).

Table 14. Comparison of Grades Received in Chemistry 151 through Spring 1992 by Full-Time Cohort Members Who Earned a Grade of C or Higher in Chemistry 080 and those Who Did Not Take Chemistry 080

Chemistry 080 Status	Grades Received in Chemistry 151														Total	
	A		B		C		Total A + B +C		W		Y		Total W + Y			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Did not take CHM 080	11	25%	14	32%	8	18%	33	75%	9	20%	2	5%	11	25%	44	100%
Earned A, B or C in CHM 080	10	30%	10	30%	4	13%	24	73%	3	9%	6	18%	9	27%	33	100%
Total	21	27%	24	31%	12	16%	57	74%	12	16%	8	10%	20	26%	77	100%

SUMMARY AND CONCLUSIONS

Summary of Findings

(1) A majority (55%) of non-foreign, full-time, new-to-higher students enrolling at PCC in Fall 1988 took all three subject area placement tests--writing, reading, and mathematics--per college policy, that is, prior to the third hour of instructional activity. Another third of these students took two of the three tests prior to the third hour of instructional activity. About 90% took the writing and reading tests, 60% the mathematics test.

(2) Nearly 90% percent of those who took the writing and mathematics tests received recommendations for developmental coursework in those subject areas, about 60% of those who took the reading test.

Almost 60% of those who took all three placement test received recommendations for developmental coursework in all three areas. About one-quarter received recommendations in two areas; and 14% in one area.

(3) About 70% of those who received recommendations for developmental coursework in writing and mathematics followed the recommendations during their first semester at PCC; just over 50% of those who received recommendations for developmental coursework in

reading did so.

(4) Students who completed (i.e., received a grade of A-F) recommended development coursework during the first semester performed better in concurrent or subsequent coursework than students who did not take recommended developmental coursework during the first semester and much better than those who took but failed to complete recommended developmental coursework (received a grade of W, Y, or I) during the first semester. This is true for all three subject areas and for a variety of performance measures (viz., first semester gpa, ratio of completed to attempted courses during the first semester, cumulative gpa through Spring 1992, ratio of completed to attempted courses through Spring 1992.)

(5) First-year course completion rates for nine developmental courses (WRT070, WRT100, REA100, REA101, REA110, REA111, MTH060, MTH070, MTH110) ranged from 42% to 83%, with a mean of 75%. REA100 and WRT070 had the lowest completion rates.

(6) Compared either with students who took but failed to complete at least one developmental course by the end of the second semester or with students who did not take at least one recommended developmental course by the end of the second semester, students who completed at least one recommended developmental course by that time were more likely to have completed fifteen or more total credits by the end of the fourth year. They were also more likely to have graduated by that time.

(7) Compared either with students who took but failed to complete HDE100 with a grade of C or higher or with students who did not take HDE100, students who completed this course with a grade of C or higher achieved a higher mean cumulative gpa and earned, on average, a higher number of total credits through Spring 1992. However, the three groups do not differ in terms of the percentage that graduated by Spring 1992.

(8) Students who earned a grade of C or higher in CHM080 were as likely as students who did not take CHMO80 to earn a grade of C or higher in CHM151.

Conclusions

The results of this study **suggest** (but do not prove) the following:

(1) Completing recommended developmental coursework early in one's PCC career promotes better performance in concurrent and subsequent coursework (as indicated by gpa and ratio of completed to attempted courses) and increases the likelihood of graduation.

(2) Completing HDE100 with a grade of C or higher promotes better

academic performance (as indicated by cumulative gpa and earned credit hours) but not necessarily the likelihood of graduation.

(3) CHM080 successfully addresses deficiencies in students' preparation for introductory college-level chemistry (inasmuch as students completing CHM080 with a grade of C or higher are as likely as students who do not take CHM080--presumably because they scored high enough on the chemistry placement test to waive it as a prerequisite for CHM151--to earn a grade of C or higher in CHM151).

Given the research design and the sampling strategy, we must be cautious in drawing conclusions about the effects of developmental course-completion on subsequent academic performance. Most certainly, there are factors other than the completion of recommended developmental coursework that influenced the subsequent academic performance of the students in this study. For example, it would not be unreasonable to suppose that the specific collegiate-level courses students took and the sequences in which they took them, influenced their gpas and course completion rates. Absent a consideration of these factors, we cannot be certain if the relationship between developmental course completion and subsequent academic performance is truly causal or, perhaps, an artifact of the operation of one or more of these other variables. Further, because the sample was restricted to a single entering cohort, we do not know whether or not the findings generalize across time.

A situation that should be a concern to the College is the large of number of students who take but fail to complete recommended developmental courses. (In individual courses the withdrawal/incomplete rate was as high as 58%). Is this the consequence of inappropriate placement, excessive course loads, or the operation of some other factor? Examining the placement process (including test validity) and the course-taking behavior of these students ought to be informative.

FUTURE RESEARCH

Understanding the Relationship between Developmental Course-Taking and Subsequent Academic Performance

As noted above, the present study lacks definitiveness with respect to the effect of recommended developmental coursework completion on subsequent academic performance because of the failure to consider additional variables that influence performance. Hence we recommend clarification of the relationship through its examination within the

context of a more sophisticated, multi-factor conceptualization of academic performance. To develop the conceptualization and illuminate statistical tests of it, we recommend the use of qualitative research, for example, focus group interviewing. To establish generalizability through time, we recommend research involving later entering cohorts of PCC students.

Understanding the Causes of High Withdrawal from Recommended Developmental Courses

We recommend that this problem be addressed by examination of both the process by which students get placed into courses through entry assessment and the patterns of course-taking that both withdrawers and non-withdrawers adopt. We also recommend the use of qualitative research, for example, individual and focus group interviews of withdrawers, to uncover the reasons for, and the consequences of withdrawing from these courses, as perceived by the withdrawers themselves.

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APPENDIX A

Data Elements for the Developmental Education Study

Missing data should be left blank.
Social Security Number (9)

Assessments Testing: note - there are 6 distinct elements, count only the first time the assessment test is taken since students can take the test more than once; we need the first test information; use the historic file on assessment testing

Before September 3, 1988 - (1)
0=no tests
1=one test
2=two tests
3=three tests

During Fall Semester, 1988 (881) after September 3 - (1)
0=no tests
1=one test
2=two tests
3=three tests
4=had already taken three tests

During Spring Semester, 1989 (882) - (1)
0=no tests
1=one test
2=two tests
3=three tests
4=had already taken three tests

During Summer, 1989 (883) - (1)
0=no tests
1=one test
2=two tests
3=three tests
4=had already taken three tests

Between Summer, 1989 (883) and the end of Spring 1992 (922) - (1)
0=no tests
1=one test
2=two tests
3=three tests
4=had already taken three tests

Total assessments taken - (1)
0=no tests
1=one test
2=two tests
3=three tests
4=had already taken three tests

Recommendations based on testing - using the first time testing for each subject area, use the historic file on assessment testing

for reading, recommendations 01, 02, 03, 04 = needs reading

for writing, recommendations 06, 07 = needs writing

(during the period under study, there has been three different math tests used: prior to July 1, 1988, the Orange and Blue Tests were used, between July 1, 1988 and June 30, 1990, Math Test III was used, after June 30, 1990, Math Test IV was used)

for math, recommendations 10,11, 12, 13 14, 23, 24, 25, 30, 31, 32 = needs math

Recommendations made prior to September 3, 1988 - (1)

1=needs Math only
2=needs Writing only
3=needs Reading only
4=needs Math and Writing
5=needs Math and Reading
6=needs Writing and Reading
7=needs all three subjects
8=does not need any of these courses
9=did not take one or more assessments prior to September 3

Recommendations made during Fall Semester, after September 3,1988 - (2)

01=needs Math only
02=needs Writing only
03=needs Reading only
04=needs Math and Writing
05=needs Math and Reading
06=needs Writing and Reading
07=needs all three subjects
08=does not need any of these courses
09=did not take one or more assessments prior to January 1, 1989
10=had prior recommendation(s)

Recommendations made during Spring Semester, 882 - (2)

01=needs Math only
02=needs Writing only
03=needs Reading only
04=needs Math and Writing
05=needs Math and Reading
06=needs Writing and Reading
07=needs all three subjects
08=does not need any of these courses
09=did not take one or more assessments prior to May 15, 1989
10=had prior recommendation(s)

Recommendations made during Summer, 883 - (2)

01=needs Math only
02=needs Writing only
03=needs Reading only
04=needs Math and Writing

Recommendations made during Summer, 883 (Continued)

05=needs Math and Reading
06=needs Writing and Reading
07=needs all three subjects
08=does not need any of these courses
09=did not take one or more assessments prior to September 2, 1989
10=had prior recommendation(s)

Recommendations made after Summer, 883 - (2)

01=needs Math only
02=needs Writing only
03=needs Reading only
04=needs Math and Writing
05=needs Math and Reading
06=needs Writing and Reading
07=needs all three subjects
08=does not need any of these courses
09=did not take one or more assessments
10=had prior recommendation(s)

First Subject Area Groups for 873 and 881 - (2) based on 45th day enrollment for Fall 1988 and official enrollment in the Summer of 87 (873 and 881 are put together)

enrollment in the following courses is used for the classification
Mth060A, Mth060B, Mth060C, Mth060, Mth064, Mth065, Mth068, Mth070A, Mth070B, Mth070C, Mth070, Mth090, Mth110A, Mth110B, Mth110C, Mth110, BUS051, BUS151=Enrolled in Math
REA068, REA071, REA073, REA077, REA078, REA100, REA101, REA110, REA111, REA112=Enrolled in Reading
WRT070A, WRT070B, WRT070C, WRT070, WRT072, WRT073, WRT077, WRT100A WRT100B, WRT100C, WRT100=Enrolled in Writing

01=enrolled in math only
02=enrolled in writing only
03=enrolled in reading only
04=enrolled math and writing
05=enrolled in math and reading
06=enrolled in writing and reading
07=enrolled in math, writing and reading
08=not enrolled in these courses but took assessment test(s) by September 3, 1988
09=not enrolled in these courses and did not take assessment test(s) by September 3, 1988

Second Subject Area Groups for 882 - (2) based on 45th day enrollment for Spring 1989

enrollment in the following courses is used for the classification
Mth060A, Mth060B, Mth060C, Mth060, Mth064, Mth065, Mth068, Mth070A, Mth070B, Mth070C, Mth070, Mth090, Mth110A, Mth110B, Mth110C, Mth110, BUS051, BUS151=Enrolled in Math
REA068, REA071, REA073, REA077, REA078, REA100, REA101, REA110, REA111, REA112=Enrolled in Reading
WRT070A, WRT070B, WRT070C, WRT070, WRT072, WRT073, WRT077, WRT100A WRT100B, WRT100C, WRT100=Enrolled in Writing
01=enrolled in math only
02=enrolled in writing only
03=enrolled in reading only
04=enrolled math and writing
05=enrolled in math and reading
06=enrolled in writing and reading
07=enrolled in math, writing and reading
08=not enrolled in these courses in 882 but took assessment test(s) prior to January 1, 1989
09=not enrolled in these courses and did not take assessment test(s) prior to January 1, 1989

Third Subject Area Groups for 883 - (2) based on official summer enrollment for Summer 1989

enrollment in the following courses is used for the classification
Mth060A, Mth060B, Mth060C, Mth060, Mth064, Mth065, Mth068, Mth070A, Mth070B, Mth070C, Mth070, Mth090, Mth110A, Mth110B, Mth110C, Mth110, BUS051, BUS151=Enrolled in Math
REA068, REA071, REA073, REA077, REA078, REA100, REA101, REA110, REA111, REA112=Enrolled in Reading
WRT070A, WRT070B, WRT070C, WRT070, WRT072, WRT073, WRT077, WRT100A WRT100B, WRT100C, WRT100=Enrolled in Writing
01=enrolled in math only
02=enrolled in writing only
03=enrolled in reading only
04=enrolled math and writing
05=enrolled in math and reading
06=enrolled in writing and reading
07=enrolled in math, writing and reading
08=not enrolled in these courses in 883 but took assessment test(s) prior to May 15, 1989
09=not enrolled in these courses and did not take assessment test(s) prior to May 15, 1989

Enrolled in HDE100 - (1), based on official enrollment, either 45th day or summer, from 873 through 922

1=enrolled in HDE100
0=was not enrolled in HDE100

Enrolled in Chemistry 080 - (1), based on official enrollment, either 45th day or summer, from 873 through 922

1=enrolled in CHM080
0=was not enrolled in CHM080

Enrolled in Chemistry 151 - (1), based on official enrollment, either 45th day or summer, from 873 through 922

1=enrolled in CHM151
0=was not enrolled in CHM151

Birth date - (6) - YYMMDD

Sex - (1)

1=male
2=female

Ethnic - (1)

1=Indian
2=Black
3=Oriental
4=Spanish
5=other
6=none of the above and no response

National Status - (1) information on foreign students is based on the VISA codes; use information from the first semester (initial enrollment); any student with a Visa is considered foreign

1=US citizen, no visa
2=Visa holder/foreign student

Rural/Metro - (1)

1=metro
0=not metro/rural

Type of high school award - (1)

0=diploma
1=GED
2=no award

High school graduation date - (4) - years, 1900 through 2000

Degree objective - (1) from the first enrollment - it is from the application

1=Basic Certificate
2=Certificate
3=AA degree
4=BA degree/transfer
5=Exploration
6=no degree plans
7=other

Reason for enrolling - (1) from the first enrollment - it is from the application

1=University transfer
2=Direct employment
3=Employment skill upgrade
4=Special interest
5=Enrollment undecided
6=Enrollment other

Limited English Proficiency - (1) enrolled in either ESL classes or WRT075 during any semester or summer from Summer 87 (873) through Spring 92 (922)

1=yes
0=no

Math Placement test results - (2) from the historic assessment files, use the first testing for math

10=Mth060A only
11=Mth060A
12=Mth060
13=Mth065 or 070 or 110 or BUS051/151
14=Mth070
15=Mth130 or 115
16=Mth150 or 125
17=Level I placement test
18=Mth150 or 160 or 125
19=Mth155 or 170 or 175
20=Mth180
21=none
22=Mth130 or Mth115
23=Mth060A only
24=Mth060 or 065
25=Mth070 or 110 or BUS051/151
26=Mth130 or 115 or 120
27=Mth150 or 160 or 125 or 135 or 210
28=Mth155 or 170 or 175
29=Mth180
30=Mth060A only

Math Placement test results (Continued)

31=Mth060 or 065
32=Mth070 or 110 or BUS051/151
33=Mth130 or 115 or 120
34=Mth150 or 160 or 125 or 135 or 210
35=Mth155 or 170 or 175
36=Mth180
60=Mth060A only
61=Mth060
62=Mth064 or 065 or 060
63=Mth070 or 110 or BUS051/151
64=Mth130 or 115 or 120
65=Mth150 or 160 or 125 or 135 or 210
66=Mth155 or 170 or 175
67=Mth180
68=Mth060A only
69=Mth060
70=Mth064
71=Mth070 (110 or BUS051/151 if enrolled in appropriate program)
72=Mth130 (115 or 120 if enrolled in appropriate program)
73=Mth150 or 160 or 125 or 135 or 210
74=Mth155 or 170 or 175
75=Mth180

Math test raw score - (3) - first test, use actual score
000=never took the math placement test
three digits of the score=raw score on math placement test

Math test, date taken - (6) - year, month, day of the first math placement test taken

Writing Placement test results - (2) from the historic assessment files, use the first testing for writing
06=WRT070 or WRT075
07=WRT100 or WRT106
08=WRT101 or WRT107
09=CLEP or WRT101
76=Invalid test - WRT070 or WRT075
77=WRT070
78=WRT100
79=WRT101
80=WRT070 or WRT075
81=WRT100 or WRT106
82=WRT101 or WRT107

Writing test raw score - (3) - first test, use actual score
000=never took the writing placement test
three digits of the score=raw score on writing placement test

Writing test, date taken - (6) - year, month, day of the first writing placement test taken

Reading Placement test results - (2) from the historic assessment files, use the first testing for reading
01=Reading Assessment Level I or REA100
02=Strongly recommend REA100
03=Highly recommend REA100
04=Recommend REA100
05=REA100 optional or Prog. Req.

Reading test raw score - (3) - first test, use actual score
000=never took the reading placement test
three digits of the score=raw score on reading placement test

Reading test, date taken - (6) - year, month, day of the first reading placement test taken

College reading requirement (1) - using the final reading placement score or grade in REA112
0=never took the assessment test or REA112
1=failed to meet the college reading requirement
2=met the college requirement either by assessment test score (Forms E and F, vocabulary raw score greater than 40 and comprehension raw score greater than 42) or passing REA112 by earning a P or a D or better

Semester specific information, repeated for every term from 873 to 922, this is for 12 terms

Semester - (3) the three digit code for the semester being reported
873=Summer of 1988 (all three sessions)
881=Fall, 1988
882=Spring, 1989
883=Summer of 1989 (all three sessions)
891=Fall, 1989
892=Spring, 1990
893=Summer of 1990 (all three sessions)
901=Fall, 1990
902=Spring, 1991
903=Summer of 1991 (all three sessions)
911=Fall, 1991

Semester (Continued)

912=Spring, 1992

Program intent/curriculum enrolled during that semester - (3) - use the 45th day and corresponding summer frozen files for the three digit program code

First Math course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as MTH060A or MTH115 or MTH180. If the course number is only 6 digits, it should be right justified - blank Mth115 or blank MTH180. If a student does not enroll in any math class during that semester, the 12 spaces should be blank.

Grade in the first math course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any math class during that semester, the 2 spaces should be blank.

Second Math course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as MTH060B or MTH110B. If the course number is only 6 digits, it should be right justified - blank Mth115 or blank MTH180. If a student does not enroll in any math class during that semester or takes only one math class, the 12 spaces should be blank.

Grade in the second math course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any math class during that semester or takes only one math class, the 2 spaces should be blank.

Third Math course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as MTH060C or MTH110C . If the course number is only 6 digits, it should be right justified - blank Mth115 or blank MTH180. If a student does not enroll in any math class during that semester or has taken two math classes, the 12 spaces should be blank.

Grade in the third math course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any math class during that semester, or has taken two math classes the 2 spaces should be blank.

First Writing course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as WRT070A or WRT072 or WRT101. If the course number is only 6 digits, it should be right justified - blank WRT072 or blank WRT100. If a student does not enroll in any writing class during that semester, the 12 spaces should be blank.

Grade in the first writing course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any writing class during that semester, the 2 spaces should be blank.

Second Writing course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as WRT070B or WRT073. If the course number is only 6 digits, it should be right justified - blank WRT073 or blank WRT077. If a student does not enroll in any writing class during that semester or takes only one writing class, the 12 spaces should be blank.

Grade in the second writing course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any writing class during that semester or takes only one writing class, the 2 spaces should be blank.

Third Writing course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 7 spaces are for the course number such as WRT070C or WRT100C. If the course number is only 6 digits, it should be right justified - blank WRT077. If a student does not enroll in any writing class during that semester or has taken two writing classes, the 12 spaces should be blank.

Grade in the third writing course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any writing class during that semester, or has taken two writing classes the 2 spaces should be blank.

First Reading course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as REA100 or REA068 or REA111. If a student does not enroll in any reading class during that semester, the 12 spaces should be blank.

Grade in the first reading course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any reading class during that semester, the 2 spaces should be blank.

Second Reading course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as REA071 or REA077. If the If a student does not enroll in any reading class during that semester or takes only one reading class, the 12 spaces should be blank.

Grade in the second reading course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any reading class during that semester or takes only one reading class, the 2 spaces should be blank.

Third Reading course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as REA078 or REA068. If a student does not enroll in any reading class during that semester or has taken two reading classes, the 12 spaces should be blank.

Grade in the third reading course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any reading class during that semester, or has taken two reading classes the 2 spaces should be blank.

Fourth Reading course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as REA078 or REA068. If a student does not enroll in any reading class during that semester or has taken three reading classes, the 12 spaces should be blank.

Grade in the fourth reading course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any reading class during that semester, or has taken three reading classes the 2 spaces should be blank.

Fifth Reading course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as REA078 or REA068. If a student does not enroll in any reading class during that semester or has taken four reading classes, the 12 spaces should be blank.

Grade in the fifth reading course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any reading class during that semester, or has taken four reading classes the 2 spaces should be blank.

Chemistry course taken in the semester - (12) use end of semester information, the fifth 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as CHM080 or CHM151. If a student does not enroll in any chemistry class during that semester, the 12 spaces should be blank.

Grade in the chemistry course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any chemistry class during that semester, 2 spaces should be blank.

First HDE course taken in the semester (5, 6) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as HDE100 or HDE170. If a student does not enroll in any HDE class during that semester, the 12 spaces should be blank.

Grade in the first HDE course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any HDE class during that semester, the 2 spaces should be blank.

Second HDE course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as HDE100 or HDE170. If a student does not enroll in any HDE class during that semester or takes only one HDE class, the 12 spaces should be blank.

Grade in the second HDE course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any HDE class during that semester or takes only one HDE class, the 2 spaces should be blank.

Third HDE course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as HDE100 or HDE170. If a student does not enroll in any HDE class during that semester or has taken two HDE classes, the 12 spaces should be blank.

Grade in the third HDE course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any HDE class during that semester, or has taken two HDE classes the 2 spaces should be blank.

Fourth HDE course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as HDE100 or HDE170. If a student does not enroll in any HDE class during that semester or has taken three HDE classes, the 12 spaces should be blank.

Grade in the fourth HDE course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any HDE class during that semester, or has taken three HDE classes the 2 spaces should be blank.

Fifth HDE course taken in the semester - (12) use end of semester information, the first 5 digits are the section code number, do not include the summer session codes; the next 6 spaces are for the course number such as HDE100 or HDE170. If a student does not enroll in any HDE class during that semester or has taken four HDE classes, the 12 spaces should be blank.

Grade in the fifth HDE course - (2) use end of the semester course grade information, use the actual letter grade such as A, B, C, D, F, P, I, W, Y, AU. If a student does not enroll in any HDE class during that semester, or has taken four HDE classes the 2 spaces should be blank.

Credits attempted in the semester - (6, including the decimal point, two values to the right of the decimal point) credits attempted are based on the enrollment as of the frozen 45th day or frozen summer file. For the summer, combine A, B, and C sessions.

Credits completed in the semester - (5, including the decimal point, two values to the right of the decimal point) credits completed are based on the end of semester information

Ratio of completed/attempted for the semester - (4, including the decimal point, two values to the right of the decimal point) the ratio is computed using credits completed divided by credits attempted

Semester GPA for the semester - (4, including the decimal point, two values to the right of the decimal point) is calculated by multiplying the number of credit hours for each course taken that semester by the number of points for the grade and dividing the sum of the total points by the total number of credit hours of A, B, C, D, and F grades for the semester. The grade information is from the end of semester file. Grades of P, I, W, Y, or AU are not included in the computation of the semester GPA.

Cumulative GPA including this semester - (4, including the decimal point, two values to the right of the decimal point) is calculated by multiplying the number of credit hours for each course taken since 873, by the number of points for the grade and dividing the sum of the total points by the total number of credit hours of A, B, C, D, and F grades. The grade information is from the end of semester file. Grades of P, I, W, Y, or AU are not included in the computation of the cumulative GPA.

Degree information repeated 6 times; degrees include Basic, Advanced, or Technical Certificates and Degrees

Degree date - (4) - year and month, starting with 8812 and ending with 9205. The date is arranged with the two digits for the year followed by two digits for the month; starting with the first degree awarded.

Degree awarded - (3) three digit code for type of degree; use the graduation file since the Basic Certificate (008) is not part of the academic file.

Curriculum that the degree is awarded - (3) the three digit code for the program